PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON
115(3):570–584. 2002.

Redefinition of *Betaeopsis* Yaldwyn, 1971, and invalidation of *Hamalpheus* Bruce & Iliffe, 1991 (Crustacea: Decapoda: Alpheidae)

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Abstract.—The poorly known alpheid shrimp *Betaeopsis indicus* (De Man), originally described from Lombok, Indonesia, is reported here for the first time from the waters of Taiwan and northern Australia. Examination of the new material has shown that the monotypic *Hamalpheus* Bruce & Iliffe, is a junior synonym of *Betaeopsis* Yaldwyn. Three of the four diagnostic features used to separate *Hamalpheus* from other alpheid genera, are present in both *B. indicus* and the type species *B. aequimanus* (Dana). These features include the peculiar hook-like spines on the uropods. *Betaeopsis,* now containing three species, is redefined, while detailed redescriptions and synonymies are provided for *B. aequimanus* and *B. indicus.* The relationships of *Betaeopsis* to *Betaeus* Dana are discussed.

The type description of the alpheid shrimp *Betaeopsis indicus* (De Man, 1910, as *Betaeus indicus*), was based on two specimens, an ovigerous female and a young individual, collected by the Siboga Expedition in Lombok, Indonesia. Subsequently, *B. indicus* was recorded in the Red Sea by Banner & Banner (1981), and in the Philippines by Chace (1988), each time accompanied by short comments and without illustrations.

In January–February 1999 one of us (AA) studied the alpheid collection at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. and examined a large male specimen from Ch'uan-fan-shih, Taiwan, carrying a label "*Betaeus* sp." This specimen presented all characters of *Betaeopsis indicus,* as described by De Man (1910), but furthermore it was found to have two conspicious hook-like spines on the tip of the uropodal endopod. This unusual feature was not mentioned in De Man's original description. The only alpheid species known to present this feature is *Hamalpheus acanthops* Bruce & Iliffe, 1991, described on the basis of a single female specimen collected in a marine lava tube on Upolu Island, Samoa. This discovery prompted the rexamination of both genera.

We examined the majority of known specimens of *B. indicus* and *H. acanthops,* including type-specimens of both species. Also examined were specimens of *Betaeopsis aequimanus* (Dana, 1852), the only other species of the genus *Betaeopsis* Yaldwyn, 1971 and its type species. All these specimens were found to bear the hook-like spines on the uropods. Furthermore, both species of *Betaeopsis* share two features considered as diagnostic for *Hamalpheus* (cf. Bruce & Iliffe 1991): the inner spines of the posterior margin of telson slightly curved upwards, and the presence of strong acute projections on the eyestalks. The only character remaining which separates *H. acanthops* and *B. indicus* is the absence of dorsal spines on the telson in the former species, a character not considered to be of

Table 1.—The branchial formula summary of *Betaeopsis* Yaldwyn, 1971.

	Mxp1	Mxp2	Mxp3	P1	P2	P3	P4	P5
Pleurobranchs				1	1	1	1	1
Arthrobranchs			1					
Podobranch	0	0	0	0	0	0	0	0
Mastigobranch			1	1	1			
Setobranchs				+	+	+		
Exopods	1	1	1					

generic importance. Hence *Hamalpheus* is placed in the synonymy of *Betaeopsis*. *Betaeopsis* is redefined, and redescriptions are provided for *B. aequimanus* and *B. indicus*.

Material and Methods

The material examined remains deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A. (USNM); Northern Territory Museum, Darwin, Australia (NTM); Queensland Museum, Brisbane, Australia (QM); Naturhistoriches Museum Wien, Austria (NHMW); Zoological Museum, University of Amsterdam, Netherlands (ZMU); and Nationaal Natuurhistorisch Museum, Leiden, Netherlands (RMNH). All measurements and scales are in millimeters. Abbreviations used in the text as following: TL = total length; CL = carapace length; Mxp = maxilliped; P = pereiopod.

Family Alpheidae Rafinesque, 1815

Betaeopsis Yaldwyn, 1971

Hamalpheus Bruce & Iliffe, 1991: 583.

Diagnosis.—Body not strongly compressed. Carapace smooth; frontal region without rostrum or orbital teeth; pterygostomial angle rounded. Eyes concealed in dorsal view, visible in frontal view; cornea well developed; eyestalks with strong anterior processes between cornea and median margin. Outer antennular flagellum biramous. Mandible with palp. Ultimate segment of third maxilliped distally armed with small spine. First pereiopods subsymmetrical, equal, carried extended with dactylus ventral; outer face of palm smooth, mesial face with blunt tubercles; cutting edges of chela with irregular teeth, lacking snapping mechanism. Second pereiopods with carpus 5-segmented. Third pereiopods with or without movable spine on inferior margin of merus; dactylus biunguiculate. Articulated plate on sixth abdominal segment absent. Second male pleopod with appendix interna and appendix masculina. Uropodal endopod with 2 hook-like spines on distal margin. Telson with or without dorsal spines; posterior margin laterally with 2 subequal spines, inner curved upwards. Anal tubercles absent. Branchial formula summarized in Table 1.

Type species.—*Betaeopsis aequimanus* (Dana, 1852), by original designation (Yaldwyn, 1971:88)

Other species.—*B. indicus* (De Man, 1910), and *B. acanthops* (Bruce & Iliffe, 1991), new combination.

Remarks.—Several important characters have been added to the generic diagnosis of *Betaeopsis*, the most important being the presence of the hook-like spines on the endopod of uropod. Bruce & Iliffe (1991) listed several characters shared by *Betaeopsis* (now including *Hamalpheus*) and *Betaeus*: absence of rostrum and orbital teeth; eyes completely covered by frontal projection of carapace; first pereiopods with chelae carried extended, with dactylus in ventral position; fingers of chelae lacking molar process and fossa; second pereiopods with 5-segmented carpus; robust ambulatory pereiopods, only first and second with epipods; diaresis of uropodal exopod nondenticulate. However, several other alpheid

genera, not closely related to *Betaeopsis* or *Betaeus,* are characterized by the absence of rostrum and snapping mechanism, have dorsally concealed eyes, five-segmented carpus and inverted first chela. The last two characteristics listed by Bruce & Iliffe (1991) are not exact. We examined most species of *Betaeus* and found that at least eight of them have strap-like epipods on first to fourth pereiopods, and not only on first and second. Also, the transverse suture in many *Betaeus* species is denticulate (finely toothed).

Betaeopsis can be separated from *Betaeus* by the presence of uropodal hooks; the reduced number of epipods; the shape of the diaresis (non denticulate in *Betaeopsis* vs. finely denticulate in most species of *Betaeus*); the absence of the articulated plate on sixth abdominal somite; and the absence of anal tubercles.

Betaeopsis aequimanus (Dana, 1852)
Figs. 1A, 2–5

Betaeus aequimanus Dana, 1852a (conspectus): 23.—1852b: 560.—1855 (atlas), pl. 35, fig. 11.—Miers, 1876: 83.—Filhol, 1885: 433.—Coutière, 1896: 384.—1899 (see Chace & Forest, 1970, for full page and figure numbers).—Thomson, 1903: 438, pl. 28, figs. 1, 2.—Richardson & Yaldwyn, 1958: 37, fig. 36 (in key).—Zarenkov, 1968: 194.

Betaeopsis aequimanus—Yaldwyn, 1971: 88.

Material examined.—3 males (largest CL 7.2 mm), Palm Beach, Waiheke Isl., southern Hauraki Gulf, North Island, New Zealand, USNM 10734. 1 male (CL 4.8 mm, TL 16 mm), Te Onepoto, North Island, coll. and depth unknown, NHMW 955.

Redescription.—Medium-sized alpheid shrimp—maximum TL about 32 mm (Thompson 1903, Richardson & Yaldwyn 1958). Carapace smooth, dorsal region with very short and scarce setae; frontal region with deep subacute, dorso-median incision (Fig. 2B) extending posteriorly to about middle of corneas (cf. Coutière 1899:65–67, figs. 9–13), triangular in dorsal and frontal views. Orbital hoods completely covering eyes in dorsal view, but open anteriorly. Eyes partially visible in lateral view. Anterior margins of each eyestalk with strong, acute process visible in lateral aspect of frontal region (Fig. 2A). Ocellar beak produced in a strong, acute tooth, well visible in dorsal and frontal view. Pterygostomial region rounded; branchiostegial margin of carapace with weak emargination above first and second pereiopods (Fig. 2H).

Antennular peduncle robust; first antennular article with strong stylocerite reaching distal half of second article or third article, and with shallow depression proximal to distal margin (Fig. 2C); medio-ventral margin with strong acute carina (Fig. 2C); second article shorter than first, and slightly longer than third; external antennular flagellum biramous, bifurcating at twelfth segment in largest specimen. Antennae robust; basicerite stout, with large ventro-lateral tooth; carpocerite exceeding both scaphocerite and antennular peduncles; scaphocerite broadly ovate (Fig. 2B), with strong lateral spine reaching to anterior margin of antennular peduncle; antennal flagellum long, very robust and flattened.

Mouthparts typical for Alpheidae (Fig. 4); mandible with incisor process bearing 5 strong teeth, a 2-jointed palp, and molar process with semicircular rows of setae; maxillule with bilobed palp, both lobes with slender plumose setae; maxilla with small palp and deeply notched upper lacinia; first maxilliped with weakly developed caridean lobe; second maxilliped with very long exopod and triangular epipod. Third maxilliped not exceeding antennal peduncle; coxa with acute lateral plate above strap-like epipod (Fig. 5C); exopod almost reaching penultimate segment of endopod; antepenultimate segment slender, longer than penultimate and ultimate segments together; ultimate segment with numerous rows of strong setae and with 1 apical spinule; ar-

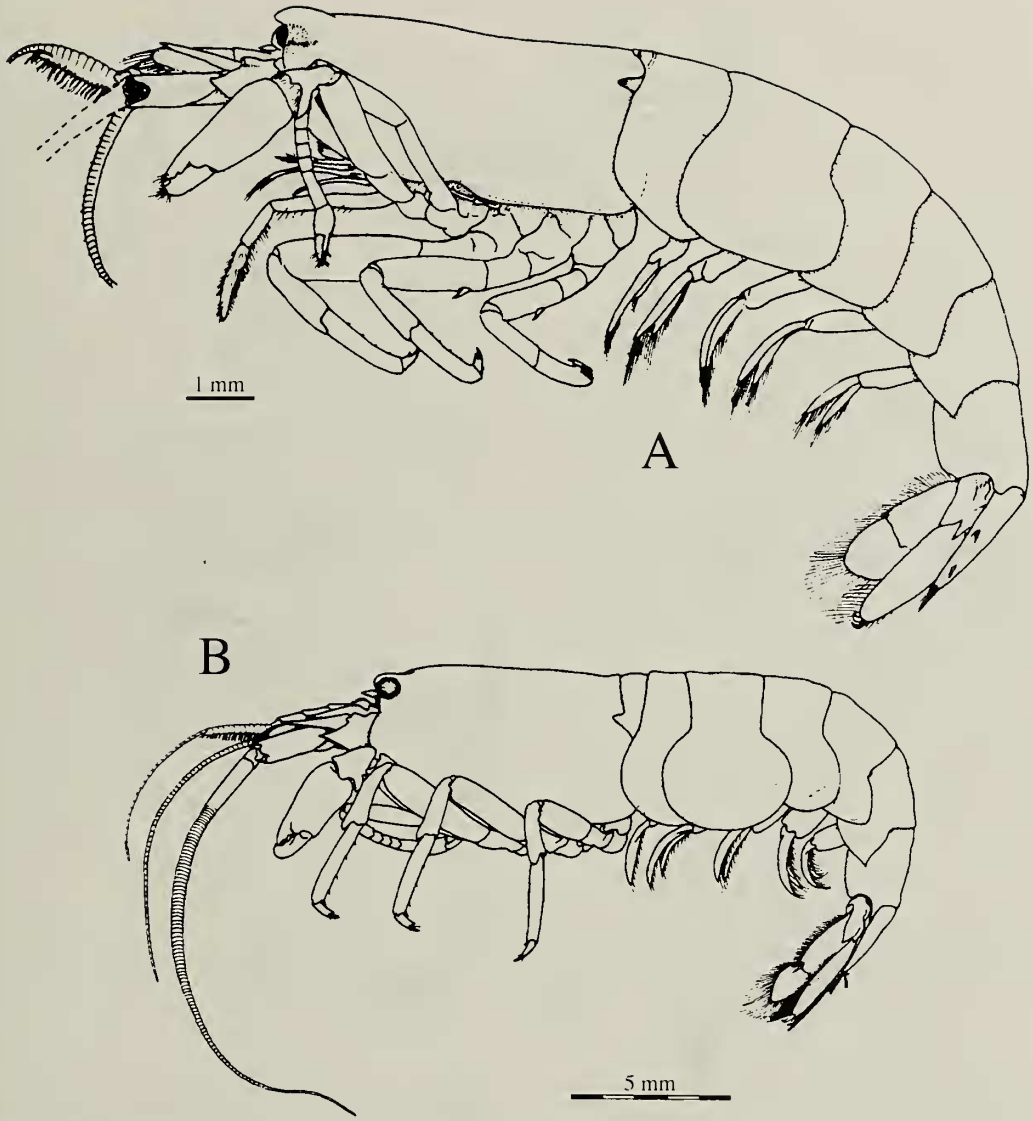

Fig. 1. A, *Betaeopsis aequimanus* (Dana, 1852). Male, USNM 10734; B, *Hamalpheus acanthops* Bruce & Iliffe 1991. Female holotype (after Bruce & Iliffe 1991).

throbranch rather feebly developed, with 4 or 5 branchial leaflets (Fig. 5A).

First pereiopods almost symmetrical and equal in size, carried extended and slightly twisted mesially (Fig. 3); coxa bearing a strap-like epipod; ischium without special features; merus as long as palm, triangular in cross-section, superior and lateral margins terminating each by distal tooth; carpus short, cup-shaped, with 3 blunt distal teeth (Fig. 3B and Coutière 1899:188, figs. 222–226); chelae slightly enlarged, with dactylus situated in ventral position; palm about 1.7 times longer than dactylus; lateral side of palm smooth, mesial side bearing row of small tubercles (Fig. 3B); fixed finger with elongated, curly setae on margin (Fig. 3C); cutting edges armed with small irregular teeth (Fig. 3D).

Second pereiopods as long as first che-

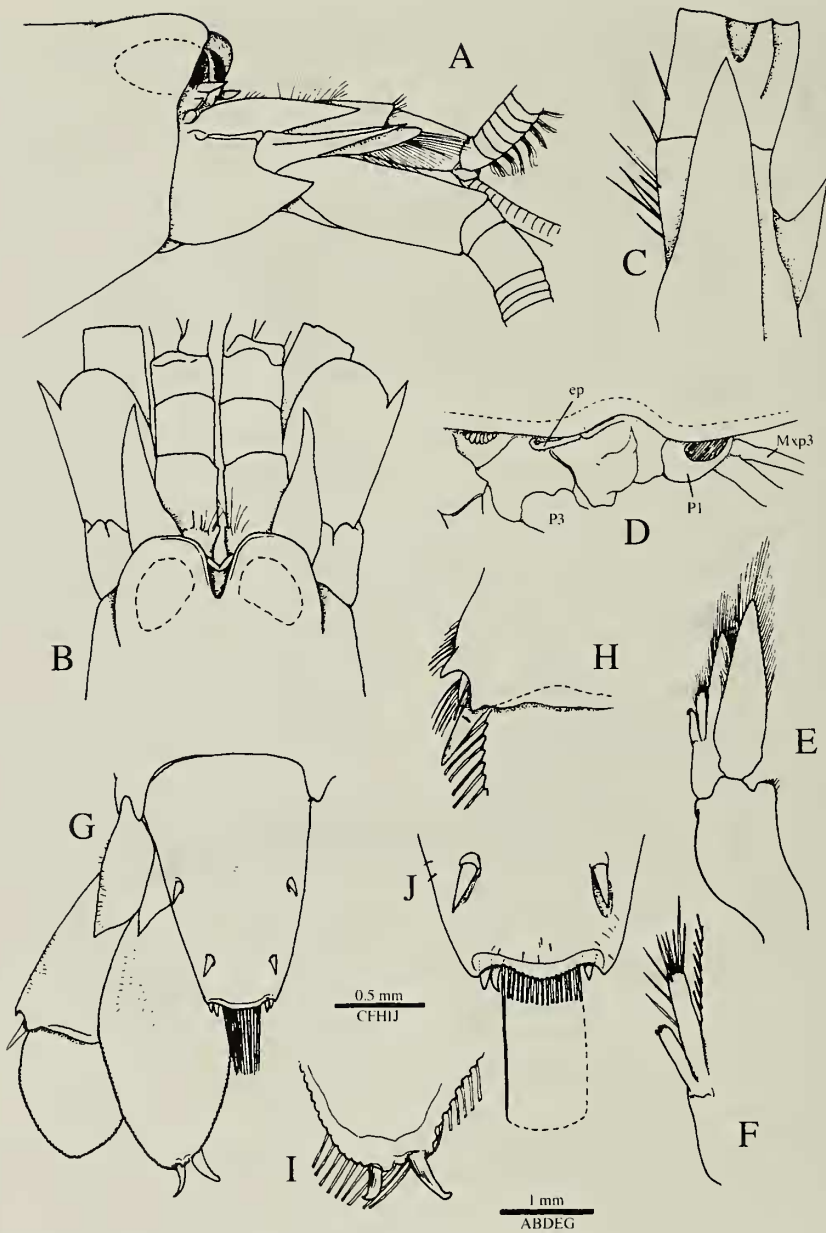

Fig. 2. *Betaeopsis aequimanus* (Dana, 1852). Male, USNM 10734. A, frontal region, lateral view; B, same, dorsal view; C, antennule: stylocerite and carina; D, branchiostegial margin from third maxilliped to third pereiopod, ep—epipod (mastigobranch), Mxp3—third maxilliped, P1—first pereiopod, P3—third pereiopod; E, second pleopod; F, same, appendix interna and appendix masculina; G, telson and left uropod; H, uropod, lateral spine; I, same, tip of endopod; J, telson, posterior margin.

lipeds when fully extended; coxa with a strap-like epipod; carpus 5-jointed, proximal article nearly as long as four following combined, proportions of carpal articles approximately equal to: 4.7 : 1.0 : 1.0 : 1.0 : 2.4 (Fig. 3E); chelae simple, with unarmed cutting edges; palm as long as distal carpal article and about 1.6 times longer than dac-

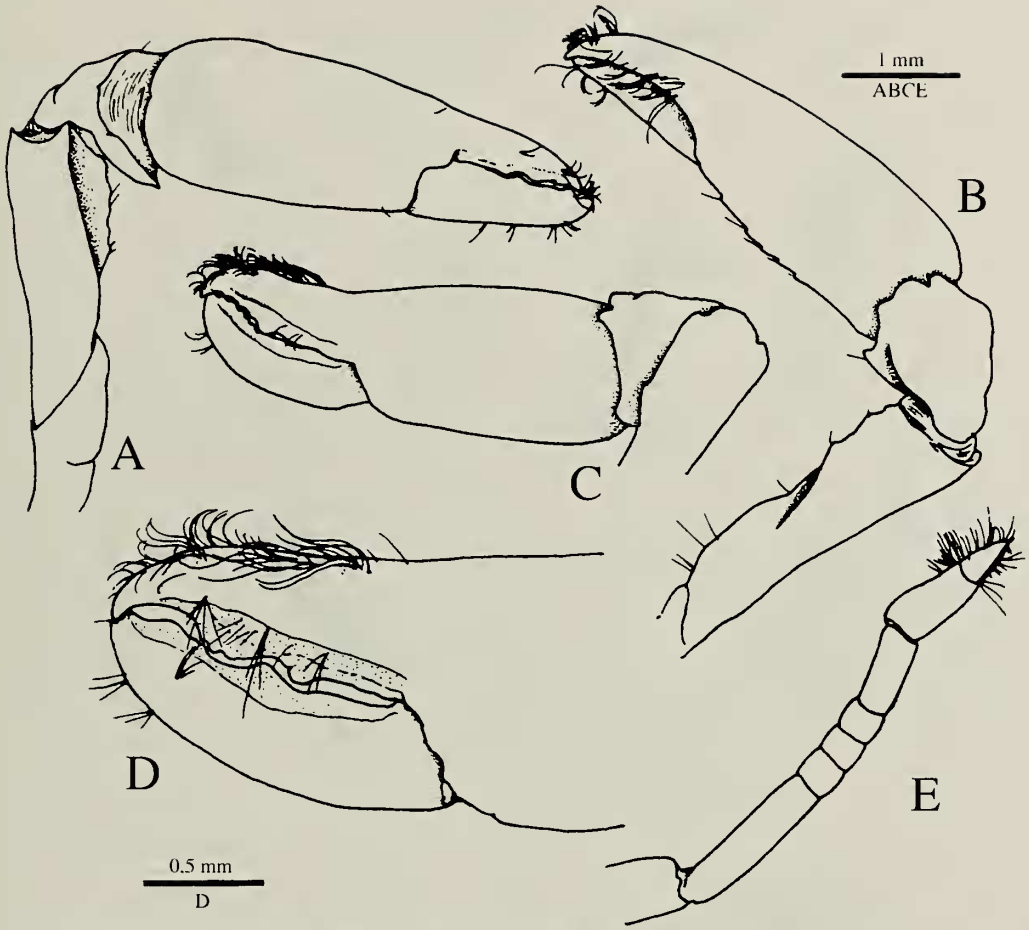

Fig. 3. *Betaeopsis aequimanus* (Dana, 1852). Male, USNM 10734. A, first pereiopod, outer and ventral view; B, same, dorsal view; C, same, inner view; D, same, fingers; E, second pereiopod, carpus.

tylus; fixed finger and dactylus with numerous thickened setae. Third pereiopod robust (Fig. 5D); coxa with setobranchs only; following articles somewhat compressed; ischium unarmed; merus armed with strong spine on proximal inferior margin (Fig. 5D); carpus with superior projection above carpo-propodal articulation, and small distal spine on inferior margin; propodus armed with 6 to 8 small, paired or unpaired spines, and 2 stronger, curved distal spines proximal to dactylar articulation; dactylus biunguiculate, secondary unguis acute, situated on distal portion of inferior margin. Fourth pereiopod similar to third, less robust and without setobranchs. Fifth pereiopod with slightly different proportions of articles (merus relatively shorter, propodus longer, Fig. 5F); spinulation of propodus reduced to 4 or 5 spines, including distal pair of curved spines; brush on distal portion of propodus composed of 3 rows of short setae (Fig. 5G).

Abdomen smooth, pleura 1–4 ventrally rounded, fifth pleuron with acute ventroposterior angle. Ventral posterior margin of sixth abdominal segment with acute median tooth. Uropods reaching far beyond telson, sparsely covered by fine setae; exopod with strong lateral spine and well marked, thickened diaresis; tip of endopod with 2 strong, ventrally curved spines. Telson broad,

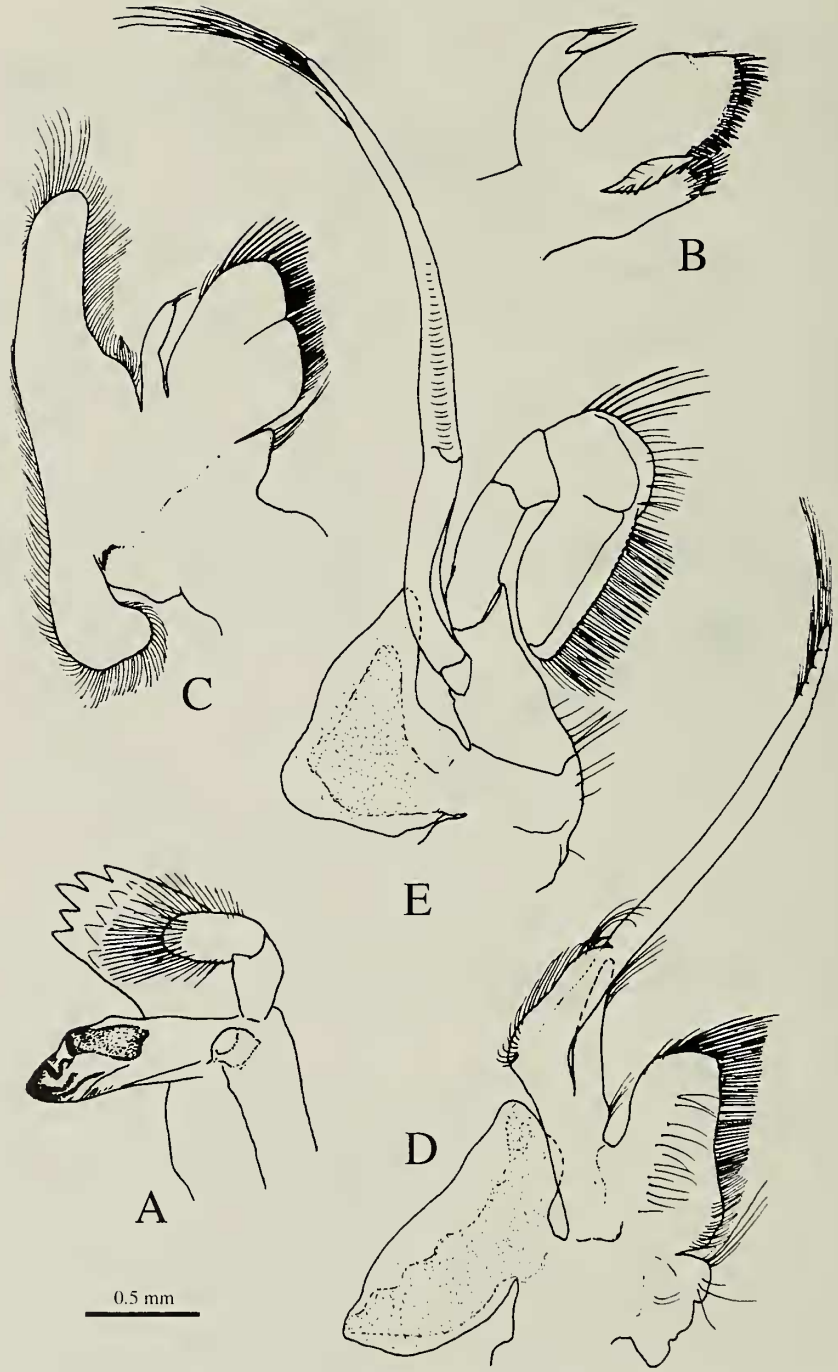

Fig. 4. *Betaeopsis aequimanus* (Dana, 1852). Male, USNM 10734. Right mouthparts in outer view (except A—inner view). A, mandible; B, maxillula; C, maxilla; D, first maxilliped; E, second maxilliped.

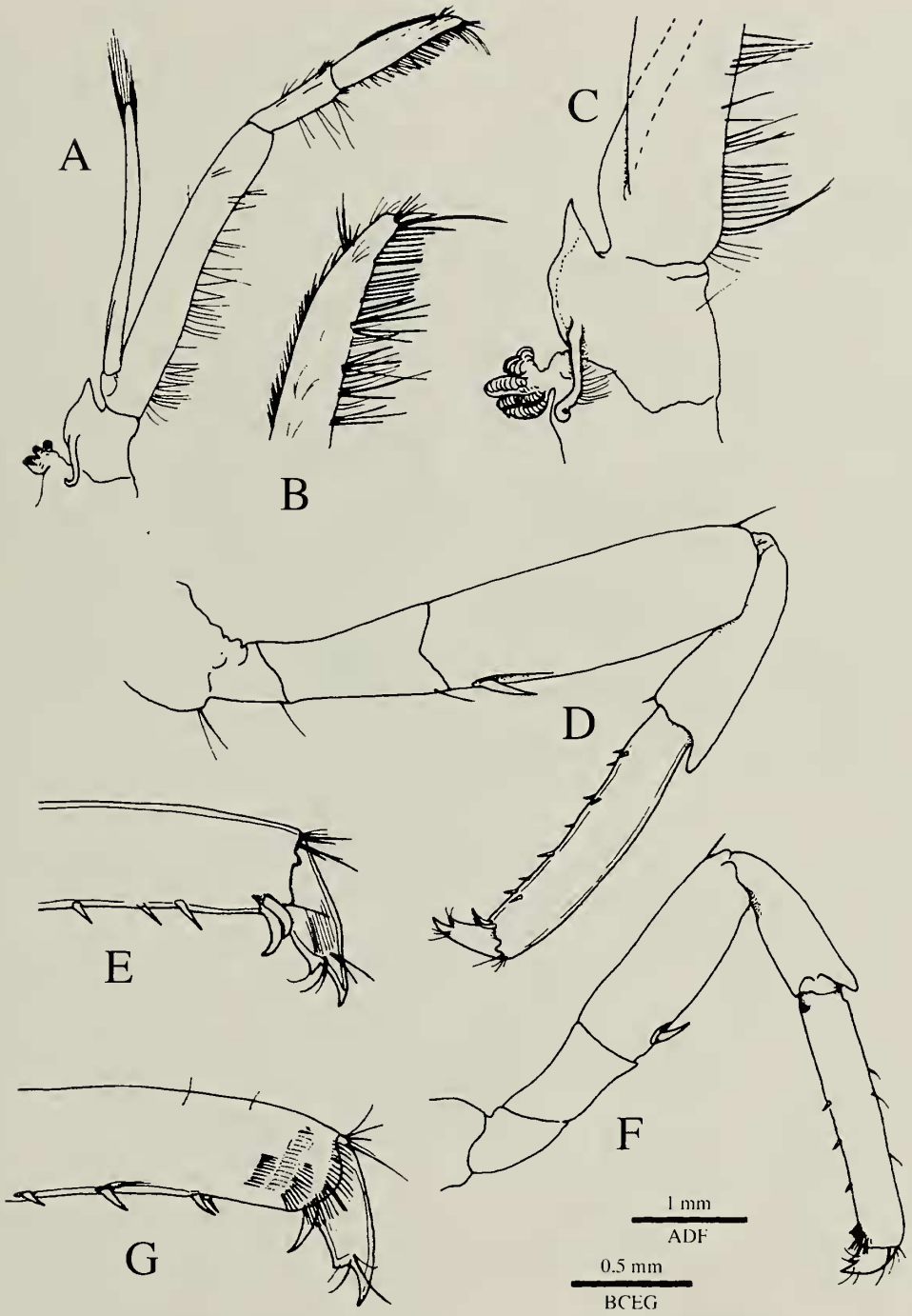

Fig. 5. *Betaeopsis aequimanus* (Dana, 1852). Male, USNM 10734. A, third maxilliped; B, same, tip of ultimate segment; C, same, lateral plate, epipod and arthrobranch; D, third pereiopod; E, same, distal portion of propodus and dactylus; F, fifth pereiopod; G, same, distal portion of propodus and dactylus.

slightly tapering, with a shallow, mediodorsal, longitudinal groove, and two pairs of strong dorsal spines; posterior margin with lateral parts somewhat angular and median part rounded; 2 pairs of subequal, short, blunt spines, inner being slightly curved upwards (right outer spine missing in one specimen, cf. Fig. 2J).

Color.—According to Thomson (1903: 439): "the specimens from Stewart Island, taken under stones, were of a uniform brownish-red colour; those from Moeraki, caught on the seaweed, were olive-green." Richardson & Yaldwyn (1958) noted the color as "orange-yellow or dark green with dorsal light-coloured band".

Type material.—Dana's (1852) types collected in the Bay of Islands are probably no more extant.

Distribution.—Restricted to temperate waters of New Zealand and neighbouring islands. Reported from Bay of Islands, Waiwera, Cape Campbell, Moeraki, Dunedin, Stewart Island, Chatham Islands (Thomson 1903, Richardson & Yaldwyn 1958), Cook Strait (Filhol 1885), Waiheke Island off Auckland.

Habitat and biology.—Found in coastal shallow waters, "most commonly under stones or among weed between tide-marks, less rarely in rock-pools" (Thomson 1903). Thomson also noted that "the normal mode of progression appears to be walking, but when disturbed the animal escapes by vigorous leaps of a foot or more in length." The shrimps may be often found in damp situations out of water, and are capable of jumping like littoral amphipods. Ovigerous females are found from August to at least January (Richardson & Yaldwyn 1958).

Betaeopsis indicus (De Man, 1910)
Figs. 6, 7

Betaeus indicus De Man, 1910: 309; 1911: 173; 1915 (atlas): pls. 4, 5, fig. 15.—Yaldwyn, 1971: 88.—D. M. & A. H. Banner, 1981: 48.—D. M. & A. H. Banner, 1985: 35.—Chace, 1988: 69.

Material examined.—Syntypes: 1 ovigerous female (CL 6.2, TL 20) and 1 young specimen, (CL 4.5, TL 14.5), Anchorage off Labuan Pandan, Lombok, Indonesia, sta. 34, 27 March (year not given), 18 m, coral reef, ZMU De102776.—1 male (CL 5.6), 09°03′08″N, 122°59′30″E, Maloh, Negros, Visayan Islands, Philippines, S.O.S.C. coll., 13 May 1978, poison, 0–1 m, USNM 213508.—1 male (CL 10, TL 27), label "*Betaues* sp.?", rocky shore, Ch'uan-fan-shih, Taiwan, 21°55′8N, 120°49′E, sta. VGS 68-21, coll. V. G. Springer, J. H. Choat, C. W. Yen, 7 May, 1968, to 13 m, USNM 362219.—1 female (CL 5.1, TL 15), 12°31′8″S, 123°33′2″E, Cartier Reef, Timor Sea, off NW Australia, coll. J. Short, sta. Ca-09, 5 May 1992, marine reef, under beach rock boulders, on sand, QM W17551.—5 specimens (not measured and sexed), Cundabilu Islands, Dahlak Archipelago, SW Red Sea, rocky eastern shore, with sand patches and corals, at 1–2 m, coll. E62 (First Israeli South Red Sea Expedition, Tel Aviv University), 20 March 1962, RMNH.

Redescription.—Medium-sized alpheid shrimp (TL 15–27 mm). Carapace smooth, with some sparse setae; frontal region with shallow median emargination (Fig. 6B). Eyes dorsally concealed completely by orbital hoods, not visible in lateral view, well visible in frontal view. Anterior margins of each eyestalk with strong, acute process (Fig. 6C). Ocellary beak well developed. Pterygostomial region rounded; branchiostegial margin with very shallow sinus above first and second pereiopods.

Antennule with well developed stylocerite reaching to midlength of second article; antennular carina as illustrated (Fig. 7E); outer antennular flagellum bifurcating at ninth-twelfth segment; antenna with robust flagellum (Fig. 6B); basicerite with acute ventro-lateral tooth; scaphocerite ovate, reaching distal part of third antennular article, bearing strong lateral spine (Fig. 6B); carpocerite of antenna exceeding both scaphocerite and antennular peduncles. Mouth-

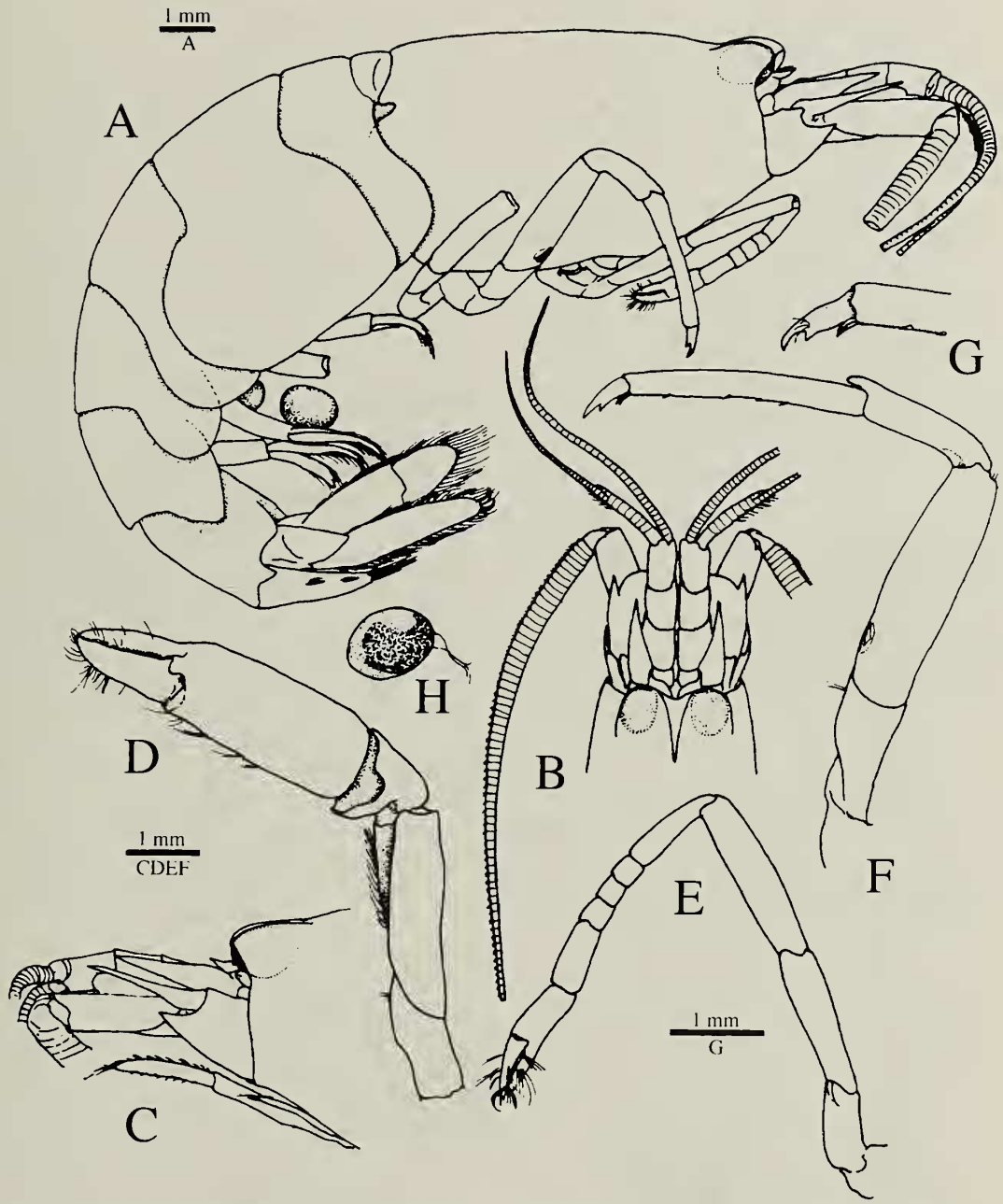

Fig. 6. *Betaeopsis indicus* (De Man, 1910). A–H,—syntype, female, ZMU De10277; B, frontal region, dorsal view (after De Man 1910); C, same, lateral view; D, first pereiopod; E, second pereiopod; F, third pereiopod; G, same, dactylus; H, egg.

parts typical for genus. Third maxilliped when extended, not exceeding antennal peduncles; exopod not reaching penultimate segment; arthrobranch weakly developed.

First pereiopods robust, with chela enlarged (Fig. 6C); merus slightly shorter than palm, more or less triangular in cross-section, with weak apical tooth on superior margin and blunt apical tooth on lateral margin; carpus with rounded distal teeth;

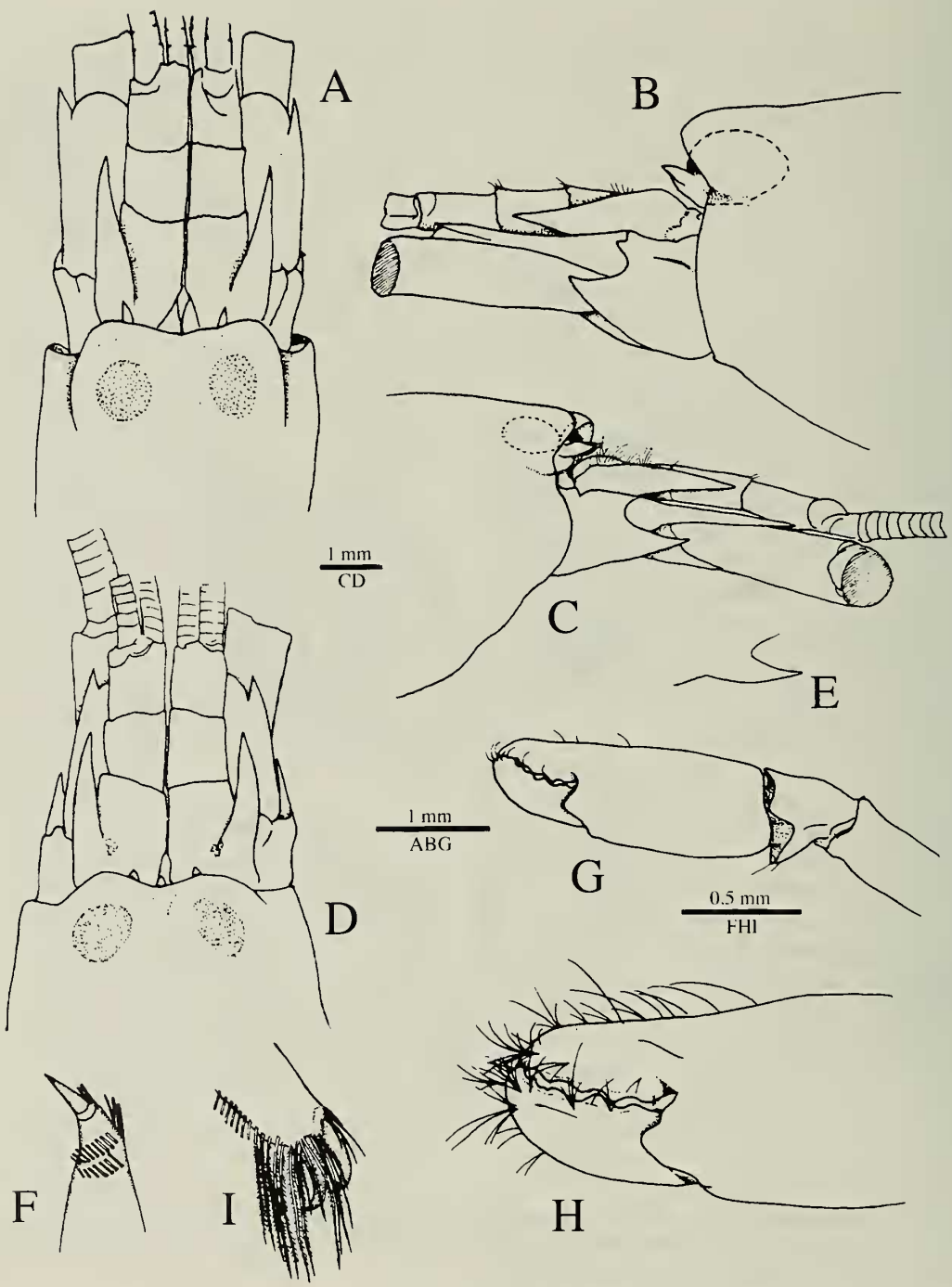

Fig. 7. *Betaeopsis indicus* (De Man, 1910). A, B, E–H, male, USNM 213508 (Philippines); C, D, I, male, USNM 362219 (Taiwan); A, D, frontal region, dorsal view; B, C, same, lateral view; E, antennular carina; F, third maxilliped, tip of ultimate segment; G, first pereiopod; H, same, fingers; I, uropod, hook-like spines at tip of endopod.

chelae not enlarged, slightly elongated, lateral side smooth, mesial side with tubercles; palm about 1.5 times longer than dactylus; opposable margins of movable and fixed finger armed with irregular rounded teeth, especially in large males; both fingers setose, especially at tips.

Second pereiopods shorter than first chelipeds when both fully extended; carpus 5-segmented, length of proximal article subequal to combined length of 3 following articles, distal article about 1.5 times shorter than proximal, proportions of carpal articles equal to 4.1 : 1.0 : 1.0 : 1.1 : 2.6 (Fig. 6E); chelae simple, palm slightly longer than dactylus, fingers with numerous tufts of thickened setae. Third pereiopod more robust than following pereiopods; merus armed with spine on inferior margin, proximal to ischium (Fig. 6F); carpus with large superior projection above carpo-propodal articulation; propodus armed with 6–8 small, paired or unpaired spines, and 2 stronger, slightly curved distal spines proximal to dactylus; dactylus slender, biunguiculate (Fig. 6G). Fourth pereiopod almost identical to third, but slightly shorter and less robust. Fifth pereiopod shorter than fourth, with reduced propodal spinulation; brush on distal portion of propodus composed of 2 rows of short setae.

Pleura 1–4 of abdomen ventrally rounded, fifth pleuron angular. Ventral posterior margin of sixth abdominal segment with rather blunt, triangular, median tooth. Exopod of uropod with well developed diaresis; endopod posteriorly with two hook-like spines. Telson with dorsal spines situated close to lateral margin (cf. De Man 1911); posterior margin slightly rounded, with subequal spines at each postero-lateral angle. Eggs rather large (about 1 mm in diameter), only few remaining (Fig. 6A, H).

Color.—Unknown in life.

Variation.—The smaller specimen from the Philippines has the orbital hoods somewhat more inflated than the larger Taiwanese specimen. The frontal margin of the latter is more emarginated and has a shallow median groove (Fig. 7A, D), while its first chelipeds are more robust and slightly more elongated than those of other specimens, obviously due to its larger size.

Distribution.—Indo-West Pacific. Previously reported from the southern Red Sea, the Philippines, and Indonesia. Present material extends its range further to Taiwan and northwestern Australia.

Habitat.—*B. indicus* seems to replace *B. aequimanus* in tropical regions, occupying probably similar habitats. Most specimens of *B. indicus* were collected on coral reefs, e.g., under rocks or boulders. The syntype specimens were collected at the depth of 18 m, all other specimens in shallower waters (0–1 m).

Remarks.—The ischial spine on the third pereiopod is usually tightly apressed to the merus. Probably for this reason this spine is lacking on the figure of the third pereiopod of De Man (1915, fig. 15e), although it was noted in the original description (cf. De Man 1910:310).

Betaeopsis acanthops (Bruce & Iliffe, 1991), new combination
Fig. 1B

Hamalpheus acanthops Bruce & Iliffe, 1991: 584, figs. 1–5.

Material examined.—Holotype, 1 female (CL 7.7, TL 27.3), sta. 83-034, Tosua-Tolesua lava tube, Lotofaga village, Upolu, W Samoa, 17 Apr 1988, coll. T. M. Iliffe & S. Sarbu, NTM Cr.007421.

Description.—See Bruce & Iliffe (1991).

Distribution.—Known only from the type locality, Upolu, Western Samoa.

Habitat.—The unique specimen was collected by hand from a shallow intertidal pool in the rear portion of a small side gallery of the cave, close to the sea. Bruce & Iliffe (1991) suggested that the spines on the endopod of the uropod could represent an adaptation to the life in these lava tubes, serving as a kind of anchor to resist to the strong water current. However, as shown in

the present study the hook-like spines are also present in *B. aequimanus* and *B. indicus,* typically intertidal species, and therefore the function of these spines remains unclear, although they could nonetheless serve to anchor the shrimp during its foraging activities between boulders exposed to wave action.

Remarks.—It has been suggested (A. J. Bruce, pers. comm.) that the absence of dorsal spines on the telson in *B. acanthops* could be an individual abnormality of the type specimen, and therefore, not even of specific value. However, as only the type specimen of *B. acanthops* has been collected and there is no other evidence to consider it abnormal, we prefer for the present to treat *B. acanthops* as a valid species distinct from *B. indicus.* We consider the absence of dorsal spines on the telson in *B. acanthops* to be a diagnostic feature sufficient to warrant an independent status to this species. More specimens from Samoa will be needed to more firmly conclude on its taxonomic status.

Key to species of *Betaeopsis*

1. Frontal region with deep, triangular, median groove. Second pereiopod equal or slightly longer than first pereiopod, proximal carpal article as long as the sum of following 4 articles. Merus of third pereiopod with strong spine on inferior margin, dactylus short. Sixth abdominal segment with acute median tooth on ventro-posterior margin. New Zealand . . . . . *B. aequimanus* (Dana, 1852)
– Frontal region without median groove. Second pereiopod shorter than first pereiopod, proximal carpal article shorter than sum of following 4 articles. Merus of third pereiopod with or without small spine on inferior margin, dactylus more elongated. Sixth abdominal segment with blunt median tooth on ventro-posterior margin. 2
2. Frontal margin with shallow median emargination. Telson with dorsal spines. Merus of third pereiopod armed with spine. Red Sea to Taiwan and Australia . . . . . *B. indicus* (De Man, 1910)
– Frontal margin almost straight. Telson without dorsal spines. Merus of third pereiopod unarmed. Samoa . . . . . *B. acanthops* (Bruce & Iliffe, 1991)

Discussion

Betaeopsis was established for two species formerly placed in *Betaeus*; the short generic diagnosis of the former by Yaldwyn (1971) contains mainly characters which enable separation of *Betaeopsis* from *Betaeus,* thus emphasizing the close relationship of these two genera. The characters separating *Betaeopsis* from *Betaeus* are the presence of an articulated flap on the sixth abdominal segment (absent in *Betaeopsis,* present in *Betaeus*) the shape of the first chelipeds (subequal, smooth in *Betaeopsis,* usually unequal and granulated in *Betaeus*), and the number of epipods on the pereiopods (reduced to two in *Betaeopsis,* four in *Betaeopsis*). No particular features or differential characteristics were mentioned for eyestalks and uropods. Furthermore, Yaldwyn's generic diagnosis includes the presence of a deep median groove on the frontal margin of the carapace, which is a species-level character (present only in *B. aequimanus*).

Dana's (1852b) original description of *B. aequimanus* is very short and superficial, and his subsequent figures (Dana 1855) are inaccurate. Coutière (1899) examined *B. aequimanus* for his monograph of Alpheidae, and discussed and illustrated in detail some morphological aspects of this species (e.g., nature of frontal incision, acute process on eyestalks, first chelipeds, posterior margin of telson, etc.). However, details regarding the presence of spines or other specific features on uropods are missing. Thomson (1903) provided the first reasonably detailed description of *B. aequimanus* but supplied only two insufficiently detailed figures (anterior region and telson). However, he noted that "the inner plate [uropod] is ovate in form, and ends in two strong

spines". It is now clear that these hook-like spines and several other diagnostic features are shared by *Betaeopsis* and *Hamalpheus*. Therefore, the latter genus must be considered as a synonym of *Betaeopsis*. Bruce & Iliffe (1991) did not compared their *Hamalpheus* specimen with the specimens of *Betaeopsis*, and have used the not always thorough or accurate data published in the older literature (A. J. Bruce, pers. comm.).

Acknowledgements

The first author (AA) is indebted to R. Lemaitre (National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.) for arranging a visit to Smithsonian Institution, and to the Office of Fellowships and Grants, Smithsonian Institution, for financial support in the form of a short-term travel grant. We also express our gratitude to C. H. J. M. Fransen (RMNH), who kindly examined specimens at the request of AA, and to D. Platvoet (ZMU), P. C. Dworschak (NHMW), K. Coombes (NTM), and J. Short (QM) for loans of material for this study. J. Clark (USNM) provided valuable information on collection sites. The manuscript benefitted from the suggestions and corrections made by A. J. Bruce (QM).

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